THE CLOUDSAT PROFILING O_2 A-BAND SPECTROMETER/IMAGER (PABSI)

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The CloudSat mission was recently selected by NASA's Earth System Science Pathfinder (ESSP) Program. This satellite will be launched in 2003, and will fly in formation with the PICASSO-CENA Lidar Mission and EOS-AQUA platform to provide the first comprehensive, global, 3-dimensional description of clouds and aerosols and their radiative effects. The primary instrument on CloudSat is a 94 GHz cloud profiling radar (CPR) that will provide detailed vertical profiles of both thin and thick clouds along the satellite's ground track. CloudSat also carries the Profiling A-Band Spectrometer/Imager (PABSI). This instrument incorporates an imaging O_2 A-Band spectrometer and 2-channel push-broom imaging system.

The PABSI spectrometer is designed to provide a high-spectral resolution (0.03 nm) description of the P-Branch of the O_2 A-band (761.5 to 772 nm). Its 60 mm f/2 foreoptics provide a spatial resolution of ~1.2 km along a 3 to 10 km wide cross-track swath that is centered on the CPR's 1.2 km footprint. This spectrometer will complement the CPR by characterizing the optical properties of clouds and aerosols at solar wavelengths and by constraining the cloud top height and geometrical thickness of low-level clouds that might be missed by the CPR. Its measurements will also provide direct estimates of optical depth and, can be combined with radar data to yield estimates of liquid and ice water contents of clouds.

The 2-channel push-boom imager provides a spatial resolution of ~0.5 km along a 15-km wide cross-track swath that is centered on the satellite's ground track. One of its two channels is centered at 747 nm, in a relatively transparent region of the spectrum that corresponds to an EOS MODIS channel (channel 15). The second channel is centered in the strong Q-R branch of the O_2 A-band. Because little solar radiation penetrates to the surface at these wavelengths, his channel provides high signal to noise observations of high altitude clouds and aerosols, while minimizing interference from the surface. These two imaging channels will provide constraints on the spatial context and fine-scale structure of the clouds that are observed by the CPR and A-band spectrometer, and facilitate the registration of their data with the PICASSO-CENA and EOS AQUA observations of clouds and aerosols.

A more comprehensive description of the science requirements, data products, implementation approach, calibration methods, data handing strategy, and cloud retrieval algorithms for PABSI will be given in this presentation.